DOCUMENT RESUME

ED 140 708 HE 009 009

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TITLE Using an Induced Course Load Matrix.
PUB DATE [77]
NOTE 16p.

EDRS PRICE MF-$0.83 HC-$1.67 Plus Postage.
DESCRIPTORS College Majors; *Computer Programs; Computers; Credit Courses; *Data Sheets; Departments; *Enrollment; Guidelines; Higher Education; Information Sources; Institutional Research; *Item Sampling; Records (Forms); Statistical Analysis; *Student Distribution; *Tables (Data)
IDENTIFIERS *Induced Course Load Matrix; University of North Carolina Chapel Hill

ABSTRACT

An induced course load matrix (ICLM) can be a valuable tool for examining the educational process at most postsecondary educational institutions, but the complexity and bulk of the ICLM computer printout is a hindrance. Experiences in using an ICLM at the University of North Carolina at Chapel Hill are described. Examples from an ICLM printout are explained, and sample tables of data derived from an ICLM are presented. (Author/LBH)

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ED140708

USING AN INDUCED COURSE LOAD MATRIX

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HE009009

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Abstract

An induced course load matrix (ICLM) can be a valuable tool for examining the educational process at most institutions of post-secondary education; however, the complexity and sheer bulk of an ICLM computer printout can discourage the interested user. This brief paper introduces the reader to ICLMs by outlining the author's experiences in using an ICLM at The University of North Carolina at Chapel Hill. Examples from an ICLM printout are explained, and sample tables of data derived from an ICLM are presented. As more and more institutions are developing the capacity for and interest in ICLMs, this paper should help researchers and administrators become more confident users of this analytical tool.

Using an Induced Course Load Matrix

This article is intended to share the author's experiences at The University of North Carolina at Chapel Hill in interpreting and using an Induced Course Load Matrix (ICLM). The reader should be aware that the material presented augments other more technical information available on ICLMs, and that ICLMs from other institutions may vary considerably in format even though the basic data are the same.

Introduction

The Induced Course Load Matrix is a means of analyzing the relationship between courses offered by departments and courses taken by students. The basic unit of analysis is the credit, or contact, hour and four levels of detail are available in the standard ICLM computer program.

1) Academic departments, subject areas, HEGIS code areas, etc.
2) Course levels - freshman, sophomore, graduate, professional, etc.
3) Student levels - freshman, sophomore, masters, etc.
4) Student major, degree program, HEGIS code major field, etc.

Obviously, the selection of these levels is important and the potential user of an ICLM needs to define the institution's requirements for data carefully, and in the planning stages, so that the necessary detail can be included in the ICLM. Levels used by The University of North Carolina at Chapel Hill (UNC-CH) are included as an example in Appendix A.

For those institutions interested in ICLMs, software and documentation are available from the National Center for Higher Education Management Systems (NCHEMS) at Western Interstate Commission for Higher Education (WICHE) as a part of NCHEMS cost simulation models for higher education. Other sources of descriptive material on ICLMs have eluded the author, but it seems likely that such may exist.

Reading the ICLM

NCHEMS software for the ICLM includes the capability of producing two basic reports, Consumption Report and Contribution Report. The former reflects the "consumers" of academic credit hours, while the latter presents data on who "contributes" credit hours to student's programs (Haight and Martin, 1975:10). Basically the data from both reports are identical, but the first one keys on departments while the second keys on student major fields. At UNC-CH we have produced only the Consumption Report as it meets the needs of our institution.

The user of ICLM has a number of options available, such as the four levels of detail discussed earlier, and each institution should select options for its ICLM which its particular needs and the situation require.

We have found four specific tables, among the options available within the Consumption Report, particularly useful at UNC-CH.

First is Table 1 which shows enrollments in major fields by student level (as defined by the institution) with data for each level within each major showing:

1) Headcount enrollment
2) Average load (credit hours)
3) FTE enrollment
4) FTE hours
5) Total hours

A "Totals" column for each major and a "Totals" row for all majors across student levels are included. For the reader's information and to keep the potential user of ICLM from feeling overwhelmed when the initial output from an ICLM run is received, Table 1 runs 29 pages of printout at UNC-CH (see Example A).

EXAMPLE A

Major Field Enrollment by Student Level

MAJOR	Freshman	Sophomore	Junior	Senior	Fifth-yr.	Special	Professional	Graduate	Total
Undecided									
Headcount	2,901	2,617	26	8		452			6,004
Ave. Load	16.42	15.44	13.85	14.13		5.14			15.13
FTE Enrol.*	3,176	2,693	24	8		23			5,924
FTE Hours	15.00	15.00	15.00	15.00		-			15.33
Total Hours	47,633	40,402	360	113		2,322			90,830
Pharmacy									
Headcount		155	137	144	140	3		35	614
Ave. Load		15.78	17.38	16.37	13.44	3.00		9.97	15.35
FTE Enrol.*		163	159	157	125	-		39	643
FTE Hours		15.00	15.00	15.00	15.00	-		9.00	14.65
Total Hours		2,446	2,381	2,357	1,881	9		349	9,423

* FTE Enrollment figures, as used here, result from dividing Total Hours by FTE Hours and do not reflect actual FTE enrollments at UNC-CH.

Second, Table 2 presents the breakdown of credit hours taken in a given department or subject area by student majors. This table is similar to Table 4, but here we collapse all student levels and course levels. Five columns of data, labeled as shown below, are included in this table:

1. "ICLM", this column shows the number of credit hours taken by the average student in a given major.

2. "HEAD ENRL", this column lists the total number of students in a given major.

3. "IWLM", this column presents the number of credit hours in the department taken by students in given majors.

4. "PERCENT OF DEPT", this column lists the percent which the number of credit hours, listed in column 3 (IWLM), taken by students in a given major are of the total credit hours taken in the department.

5. "PERCENT OF MAJOR", this column shows the percent which the number of credit hours, listed in column 3 (IWLM), taken in this department by students in a given major are of the total number of credit hours taken by all students in that major. A "Totals" row for each department is included. At UNC-CH this table is 149 pages of printout (see example B).

EXAMPLE B

Credit Hours Taken in a Department by Student Majors

DEPT = Administration of Justice

MAJORS	ICLM	HEAD ENRL	IWLM	PERCENT OF DEPT.	PERCENT OF MAJOR
Physics	.03	86	3	3.45	.39
Psychology	.01	621	6	6.90	.08
Crim. Just.	1.93	14	27	31.03	13.37
Inter. Disp.	.03	103	3	3.45	.20
History	.01	424	6	6.90	.12
Poli. Sci.	.04	448	18	20.69	.31
Sociology	.03	184	6	6.90	.27
Law	.00	659	3	3.45	.03
Busi.-Gen.	.01	1,489	15	17.24	.07
Totals		4,028	87	100.01	

Third, Table 3 shows the distribution of credit hours taken in the department across course levels as stipulated by the institution. A "Totals" column and a "Totals" row are included; this table is seven pages long (see Example C).

EXAMPLE C

Credit Hours Taken in a Department by Course Level

DEPT. \ COURSE LEVEL	SPECIAL	FRESH-SOPH	JR-SR	UNDERGRAD-GRAD	GRAD-ONLY	TOTAL
English	12	13,716	3,214	429	801	18,172
Music	9	3,534	916	306	174	4,939
Physics		4,367	149	308	171	4,995
Social Work				987	2,039	3,026

Fourth, similar to Table 2, Table 4 presents the number of credit hours

taken in departments broken down by course level, student level and major field. Even though bulky (273 pages) and somewhat difficult to use, Table 4 forms the basis of the ICLM, and a wealth of information can be extracted from it by the patient user.

Using the ICLM

Now that you've got it, what do you do with it???

The sheer magnitude of information contained in an ICLM becomes the next hurdle in making constructive use of the data. Experience suggests a piecemeal approach to small, more manageable segments of the data while keeping in mind the needs of the institution and the basic reasons for producing an ICLM. For instance, institutions often develop ICLMs in order to analyze service contributions of academic departments in providing course opportunities to students majoring in other departments. Using Table 2, as outlined previously, one could prepare a simple chart or bar graph comparing the percent of credit hours taken in each department by students majoring in that department. Or, a more detailed approach would be the preparation of a chart showing the percentage distribution of credit hours taken in each department by students in each major field. Such a chart is routinely prepared from each ICLM run at UNC-CH.

In keeping with the idea of a piecemeal approach, experience also suggests that few administrative offices or academic departments are interested in a complete ICLM. Rather, it often seems that offices or departments have specific questions which only require small parts or bits of information from the ICLM to answer. Thus, it is suggested that the primary office responsible for producing and interpreting an institution's ICLM prepare one or two charts of general interest, such as the two discussed above, which can be circulated throughout the institution. Along with these charts, the primary office could provide a brief outline of the additional types of information which could be derived from the ICLM for offices or departments with specific interests. Not only does this approach avoid the expense of preparing, printing, and distributing a great quantity of material, but it also allows the office responsible for the ICLM to concentrate on meeting requests for information which is specifically needed.

For examples of the type of information which can be gathered from the ICLM and for examples of sample tables which are distributed to administrative offices and academic departments at UNC-CH, refer to Appendix B which presents five tables of data derived from the Fall Term, 1976, ICLM of The University of North Carolina at Chapel Hill. These tables present actual data for the History Department at UNC-CH; however, the main importance of the tables is in the display and type of information contained in the tables rather than in the actual numbers themselves.

Summary

An Induced Course Load Matrix can provide useful information about the nature of the educational process at an institution of higher education while serving as a basis for discussion and informed decision-making. Quite possibly, an ICLM is the best source of data for analyzing the pattern of course-taking/offering within an institution. Constraints of interpretation difficulty and sheer volume of data may inhibit the first-time user, but patience and persistence stand to be rewarded by the achievement of a clearer understanding of the academic environment of the institution. Hopefully, this brief article will be of assistance in that process.

REFERENCES

Haight, Michael J. and Charles W. Manning. Induced Course Load Matrix Generator. National Center for Higher Education Management Systems at Western Interstate Commission for Higher Education, no date.

Haight, Michael J. and Ron Martin. NCHEMS Costing and Data Management System Student Data Module Reference Manual. National Center for Higher Education Management Systems at Western Interstate Commission for Higher Education, Technical Report No. 60, January, 1975.

APPENDIX A

ICLM Levels Used by The University of North Carolina at Chapel Hill

1) Academic departments or subject areas

ADJU - Administration of Justice
AERO - Aerospace Studies
AFAM - Afro-American Studies
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STAT - Statistics
SURG - Surgery
SWAH - Swahili
ZOOL - Zoology

2) Course levels

1. Special courses
2. Lower Level - for freshmen and sophomores
3. Upper Level - for juniors and seniors
4. Undergrad-Grad - for seniors and graduate students
5. Grad Only - for graduate students

3) Student levels

1. Freshman
2. Sophomore
3. Junior
4. Senior
5. Fifth-year students
6. Special students
7. Professional students
8. Graduate students

4) Student majors

All areas in which students can major at the university, plus designations for undeclared major, special major, and evening college students.

APPENDIX B

Table 1 History Department Fall 1976 - Credit Hour Enrollment

Major Field	# Hours Taken In History 1/	% Hours of Hist. Dept. 2/	# Hours in History Per Average Major 3/	% Hours in History of Majors 4/
No Major (G.C.)	4,608	38.73	0.77	5.07
Inter-Institutional	3	0.03	0.02	0.65
BS Dent	3	0.03	0.38	2.61
BS Law	6	0.05	1.50	13.04
Botany	21	0.18	0.22	2.26
Zoology	78	0.66	0.32	2.45
Biology	105	0.88	0.46	3.11
English	492	4.14	0.89	7.80
Comp. Lit.	6	0.05	0.12	1.23
Folklore	3	0.03	0.50	5.88
Art Hist.	33	0.28	0.30	3.06
Art Studio	54	0.45	0.59	4.54
Music (lib. arts)	33	0.28	0.39	4.43
Music (perf.)	15	0.13	0.36	2.77
Dram. Art	24	0.20	0.27	2.21
Linguistics	3	0.03	0.09	1.14
French	18	0.15	0.40	3.48
Germanic Lang.	6	0.05	0.13	1.61
Russian	3	0.03	0.60	5.88
Spanish	6	0.05	0.19	2.60
Classics	12	0.10	0.19	2.23
Romance Lang.	6	0.05	0.05	0.73
Slavic Lang.	3	0.03	0.19	3.33
Geography	33	0.28	0.50	4.59
Math Sci.	3	0.03	0.08	0.59
Math	36	0.30	0.28	2.23
Philosophy	27	0.23	0.44	4.51
Chemistry	258	2.17	0.48	3.90
Physics	24	0.20	0.28	3.16
Geology	6	0.05	0.07	0.64
Med. Tech.	3	0.03	1.50	9.68
Psych.	315	2.65	0.51	3.98
Lat. Am. Studies	9	0.08	2.25	14.29
Rec. Admin.	93	0.78	0.45	3.27
Crim. Just.	12	0.10	0.86	5.94
Religion	60	0.50	1.22	8.65
Interdisciplinary	66	0.55	0.64	4.49
Afro. Am. Studies	15	0.13	5.00	33.33
Afro. Studies	3	0.03	3.00	18.75
American Studies	180	1.51	2.81	18.54
Anthropology	72	0.61	0.71	6.75
Economics	120	1.01	0.56	4.48
History	2,130	17.90	5.02	43.12
International Studies	78	0.66	1.50	9.94
Political Science	558	4.69	1.25	9.64
Sociology	99	0.83	0.54	4.39

Table 1 History Department Fall 1976 - Credit Hour Enrollment (continued)

Major Field	# Hours Taken In History 1/	% Hours of Hist. Dept. 2/	# Hours in History Per Average Major 3/	% Hours in History of Majors 4/
Physical Education	24	0.20	0.31	2.58
Indus. Rel.	132	1.11	0.86	5.92
Journalism	378	3.18	1.30	9.29
Law	12	0.10	0.02	0.13
Library Science	3	0.03	0.02	0.19
RTVMP	207	1.74	0.80	5.95
Business General	741	6.23	0.50	3.46
Spec. Studies	6	0.05	0.04	0.81
Peace, War, Defense	18	0.15	2.00	12.68
Education	531	4.46	0.34	3.40
Med. Hosp.	24	0.20	0.44	2.95
Dent. Hyg.	3	0.03	0.03	0.18
D.A.T.E.	6	0.05	0.25	1.83
Nursing	27	0.23	0.07	0.52
Pharmacy	45	0.38	0.07	0.47
Total	11,898			

1/ Number of Credit Hours in History taken by all majors in the fields listed Fall Semester 1976. For instance, on the first line one sees that students with no major (General College) took 4,608 credit hours in History during the fall term.

2/ Percent of the total Credit Hours in History which were taken by majors in the fields listed. Once again using General College students, one sees that they took 38.73% of all credit hours in History (4,608/11,898).

3/ This column gives the number of credit hours in History which the average major, in the fields listed, took during fall term. The average General College student took 0.77 hours in History. If we assume that the normal history course offers three credit hours, then it appears that one out of every four (3.0/0.77) General College students took a history course this fall.

4/ Percent of all hours taken by majors in the fields listed which were taken in History during fall term. For instance, of all the credit hours taken by all General College students during fall term, 5.07% were in History.

Table 2 History Majors - Student Levels - Fall 1976

	Juniors	Seniors	Spec.	1st Prof.	Graduate	Total
Headcount	110	167	20	1	126	424
Average Load	14.62	14.79	6.70	15.00	5.66	11.65
FTE Enrollment	107	165	1	2	79	354
FTE Hours	15.00	15.00	-	-	9.00	13.95
Total Hours	1,608	2,470	134	15	713	4,940

Table 3 History Department Credit Hours - Course Levels - Fall 1976

Course Level	Number Credit Hours Taken	Percent of all Credit Hours at Each Level
Special	12 (1.01%)	17.91
Freshman-Sophomore	6,255 (52.57%)	5.19
Junior-Senior	1,347 (11.32%)	2.81
Undergraduate-Graduate	3,852 (32.38%)	7.23
Graduate Only	432 (3.63%)	1.28
Total	11,898 (100%)	4.65

Table 4 History Department Credit Hours - Course Level - Student Level
Fall 1976

Course Level	Student Level	Number of Credit Hours in History
Special	Sophomore	9
	Special	3
Freshman-Sophomore	Freshman	2,118
	Sophomore	2,001
	Junior	1,215
	Senior	720
	Fifth Year	9
	Special	192
Junior-Senior	Freshman	24
	Sophomore	195
	Junior	498
	Senior	624
	Special	6
Undergraduate-Graduate	Freshman	6
	Sophomore	153
	Junior	1,395
	Senior	2,001
	Fifth Year	9
	Special	24
	1st Prof.	12
	Graduate	252
Graduate Only	Special	6
	Graduate	426

Table 5 Subject Areas in Which History Majors Took Courses, Fall 1976

Subject Area	# Credit Hours	% of Hours in Major
ADJU	6	0.12
AFRI	6	0.12
AMST	6	0.12
ANTH	81	1.64
ART	123	2.49
ASTR	12	0.24
BIOC	6	0.12
BIOL	4	0.08
BOTN	15	0.30
BUSI	147	2.98
CHEM	30	0.61
CHIN	30	0.61
CLAR	36	0.73
CLAS	69	1.40
CLIT	3	0.06
COMP	6	0.12
DRAM	42	0.85
ECON	159	3.22
EDSP	6	0.12
EDUC	51	1.03
ENGL	252	5.10
ENVR	4	0.08
FREN	125	2.53
GEOG	114	2.31
GEOL	57	1.15
GERM	28	0.57
GHAN	12	0.24
GREK	12	0.24
HEBR	6	0.12
HEED	18	0.36
HIST	2,130	43.12
HNRS	3	0.06
ITAL	24	0.49
JOUR	27	0.55
LATN	24	0.49
LIBS	3	0.06
MATH	42	0.85
MACH	2	0.04
MUSC	42	0.85
NAVS	15	0.30
PHAR	1	0.02
PHIL	87	1.76
PHYA	20	0.40
PHYE	51	1.03
PHYI	5	0.10
PHYS	33	0.67

Table 5 Subject Areas in Which History Majors Took Courses Fall 1976 (continued)

Subject Area	# Credit Hours	% of Hours in Major
PLAN	3	0.06
POLI	462	9.35
PORT	9	0.18
PSYC	114	2.31
PWAD	6	0.12
RECR	12	0.24
RELI	69	1.40
RTVM	51	1.03
RUSS	21	0.43
SOCI	75	1.52
SPAN	46	0.93
SPCH	57	1.15
STAT	15	0.30
SWAH	3	0.06
ZOOL	4	0.08